



Introduction to Visual and Physiological Optics feature issue of *Biomedical Optics Express* and *JOSA A*

JUAN TABERNERO,¹ LINDA LUNDSTRÖM,² CHRISTINA SCHWARZ,³ AND BRIAN VOHNSEN⁴

¹University of Murcia, Murcia, Spain

²Royal Institute of Technology/KTH, Stockholm, Sweden

³University of Tübingen, Tübingen, Germany

⁴University College Dublin, Dublin, Ireland

Abstract: This feature issue collects articles presented at the tenth Visual and Physiological Optics meeting (VPO2022), held August 29–31, 2022, in Cambridge, UK. This joint feature issue between *Biomedical Optics Express* and *Journal of the Optical Society of America A* includes articles that cover the broad range of topics addressed at the meeting and examples of the current state of research in the field.

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The tenth edition of the Visual and Physiological Optics meeting (VPO2022) took place on August 29–31, 2022, in Cambridge, United Kingdom. After a two-year delay due to the COVID-19 pandemic, approximately 100 researchers showcased their latest innovations in the field of visual optics and vision sciences. A diverse range of topics were explored across the full spectrum of the field, from advanced instrumentation for adaptive optics and imaging to the evaluation of ocular biometry, biomechanics, and optical properties with applications in myopia, presbyopia, refraction, and correcting lenses. The Visual and Physiological Optics community is highly dynamic, characterized by the rapid translation of fundamental scientific findings into practical applications. In this feature issue collection, readers will discover excellent examples of this, along with a comprehensive compilation of articles covering most of the topics presented at the VPO meeting.

Starting from basic science, Hughes *et al.* provide valuable insights into the basic structure of ocular aberrations in infants [1]. This feature issue includes more examples of studies describing ocular aberrations, not only those occurring along the central axis but also those affecting vision in the peripheral retina [2,3]. The investigation of the peripheral retina has emerged as a prominent research area, driven by its potential implications for myopia development. This feature issue introduces innovative scanning devices to assess the peripheral optics of the eye [4,5], as well as optical testing of novel spectacles designed to slow down myopia progression in children [6]. Myopia research is also the topic of the study by Breher *et al.*, challenging the hypothesis that intraocular scattering inhibits myopia [7].

In general, a better understanding of the anterior optics of the eye helps in the design of new refractive corrections. In this context, the optical design of intraocular lenses (IOLs) that are implanted after cataract surgery stands out as a highly dynamic field. The articles in this collection include unconventional and modern approaches, such as the intraocular pinhole [8], an innovative intraocular meniscus IOL [9], and the Devil IOL [10].

Advances in imaging techniques, specifically those related to eye movement correction and enhanced image processing, play a crucial role in the improvement of OCT corneal imaging [11], fundus imaging, and retinal microscopy [12]. Additionally, significant progress has been made in various optical techniques related to vision. Researchers specializing in low vision have successfully developed improved optical aids to assist individuals with vision loss [13].

Furthermore, the use of holographic filters holds promise for personalized amblyopia treatments [14]. Virtual Reality (VR) displays are gaining increasing attention both in society and in the research domain. Güzel *et al.* detailed a pioneering glasses-free VR display specifically tailored for individuals with visual impairments [15].

Finally, psychophysical methods for assessing visual performance are well-represented in this collection. These encompass a laser system to assess brightness perception in two-photon vision [16], novel tests designed to evaluate functional vision for toric contact lens wearers [17] and the innovative assessment of dynamic aspects of vision concerning rapid defocus changes made possible by the use of tunable lenses [18,19]. A new metric to quantify contrast sensitivity that may help to describe and follow up visual performance of aberrated eyes was also proposed [20].

These papers, together with other recently published work on the topics [21–36], provide an up-to-date sample across the current state of research in most fields and sub-fields of Visual and Physiological Optics. We hope that readers of *Biomedical Optics Express* and *JOSA A* will enjoy reading these papers and find them inspiring for future VPO meetings.

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